



## Trawl and Prawn Sampling

### Focus Questions:

- What is a trawler and how does it operate?
- What gear types do prawn vessels use and how do they operate?
- How is information collected on these gear types and what forms are used?

### Chapter Outline:

- I. Trawl and Prawn Pot Gear and Fishing Strategy Description
- II. Collecting and Documenting Trip Information
- III. Sampling Catch
- IV. Collecting and Documenting Species Composition
- V. Examples

## I. Trawl and Prawn Pot Gear Fishing Strategy Description

### Trawlers

Most trawl vessels on the west coast are stern trawlers, using one net that is set and retrieved off the sloping stern ramp at the back of the vessel. However, there are also many trawlers that are side haulers. These vessels set and retrieve their nets over the side of their vessels (See Figure 4 – 1).

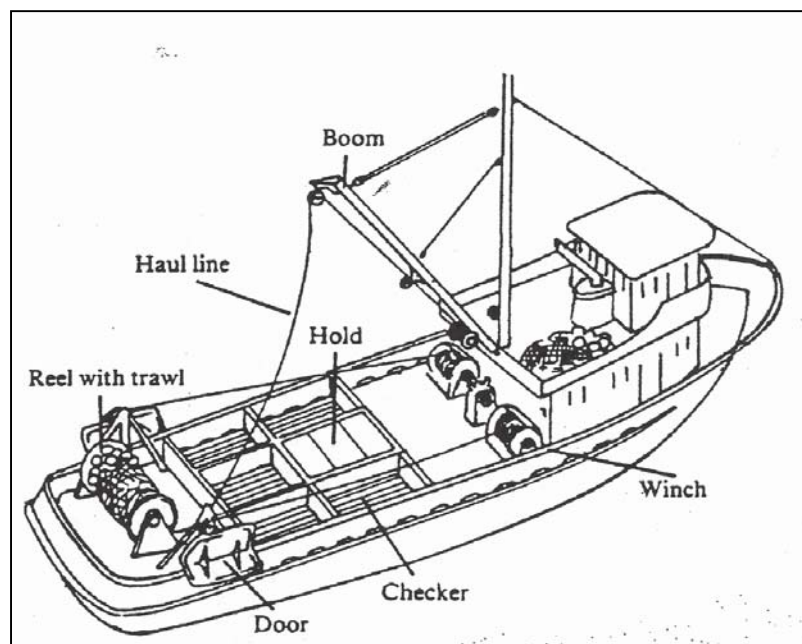


Figure 4- 1: Trawl Vessel

Trawling involves the towing of a funnel-shaped net behind the fishing vessel (See Figure 4 – 2). Trawl nets may be towed on or near the seafloor or in the water column. West coast trawlers use “doors” in front of and on each side of the net to spread the mouth of the net horizontally. The doors are pushed apart and down by hydrodynamic forces and by their own weight. Aluminum or plastic floats laced to the headrope on the upper lip of the net and a weighted footrope, laced to the lower lip of the net, holds the net mouth open vertically. The length of the cable (main wire) dragging the net behind the vessel determines the towing depth. Trawl nets can be 100’ or greater in width across the opening and over 150’ long.

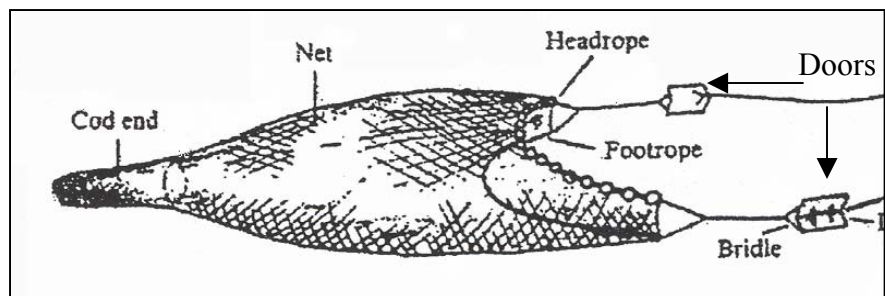


Figure 4- 2: Trawl Net

The **footrope** or groundrope is directly attached to the bottom, leading edge of the mouth of the net. The purpose of the footrope is to separate the target species from the seabed and raise the netting far enough above the seabed to prevent damage. The footrope may be weighted with chain or may be rope-wrapped wire or cable when fishing on a soft bottom. If the net is towed over rough bottoms (as for rockfish or spot prawns) steel bobbins, rubber disks or rubber rollers (‘tires’) are attached to the footrope. The bobbins are designed to roll and drag over the bottom (See Figure 4-3).

Regulations governing harvest levels in the groundfish trawl fleet have a footrope component. There are two “sizes” of footropes used in the groundfish trawl fleet.

**Large Footrope** – Any footrope that includes one or more rollers that is greater than or equal to 8 inches in diameter.

**Small Footrope** – Any footrope where all rollers are less than 8 inches in diameter.

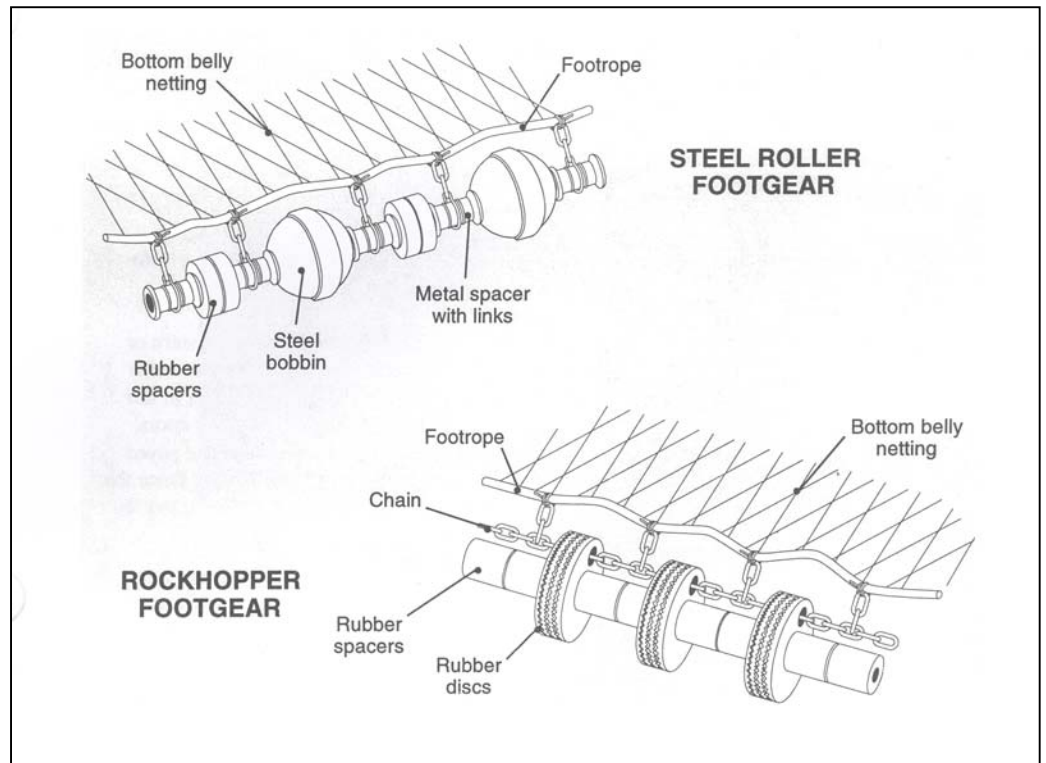


Figure 4- 3: Roller Gear

There are a variety of types of trawl gear:

**Bottom Trawl** – One net is towed with the footrope in contact with the seabed. Bottom trawlers include roller (also called bobbin) trawls and Danish and Scottish seine gear. A bottom trawl is generally towed at two to four knots on or above the sea floor.

**Outrigger** – Any pole that can be lowered over the side of a boat and is used to enhance stability and aid in fishing.

**Paired Bottom Trawls (Double Rigged)** – Two nets are towed, one net off each side of the vessel from large **outriggers** lowered at 60° angles. The nets are folded on deck or hung from booms when not fishing. They have two sets of doors, one set for each net. Paired nets are often used for prawn/shrimp fishing.

**Midwater Trawl** – The requirements for a midwater net include a protected footrope and no bobbins or rollers on the net. Midwater trawls are generally towed above the ocean floor, although they may be used near the bottom. They are generally towed faster than bottom trawls to stay with the schooling fish they target.

Trawl gear is used to harvest:

Deep Water Slope Fish (Sablefish, Dover Sole, Shortspine and Longspine Thornyheads)

Shelf and Slope Rockfish

Midwater Rockfish (Widow, Yellowtail, and Chilipepper)

Shelf and Slope Flatfish

Pacific cod

Pacific hake

Prawn/Shrimp (Pink, Spot and Ridgeback Prawns)

California Halibut

Trawl gear varies depending on the species sought and the size and horsepower of the boats used.

## **Prawn Pot**

The words “pot” and “trap” are used interchangeably to mean baited cages set on the ocean floor to catch fish and shellfish. They can be circular, rectangular or conical in shape. The pots may be set out individually or as strings with multiple pots attached to a groundline.

All pots contain entry ports and escape ports that allow undersized or unwanted species to escape. Additionally, all pots used must have biodegradable escape panels or fasteners that prevent the pot from continuing to fish if lost.

Strings of pots are marked at each end with a pole and flag and sometimes a light or radar reflector. Individual pots are marked with surface buoys.

Prawn pots (e.g. spot prawn and coonstripe) have small mesh. The coonstripe prawn pot uses various configurations, the most common being a rectangular pot with two circular openings. The pots are set in depths ranging from 23-28 fathoms in strings of between 20 to 30 traps. Fishermen will use 300 to 400 pots during the fishing season. The pots are baited with herring, sardine, and mackerel.

## Diversity of Fleet and Effects on Sampling

Although vessel characteristics make the fleet very diverse, sampling protocols are consistent for all net and prawn/shrimp pot vessels. There are, however, a number of vessel characteristics that influence catch sampling. The most important characteristics that influence sampling are:

Groundfish Trawl Vessels on the West Coast range from 40 feet to 80 feet.

1. **Vessel size** – The size and layout of a vessel is often a limiting factor when sampling. A vessel with a small deck may not have enough deck space to hold the entire discard. Therefore, the vessel may sort the discard directly out a scupper, over the side or down the stern ramp. It is possible to do an actual weight for a subset of species within the discard (i.e. rockfish or prohibited species) but the majority of the discard weight will be visually estimated.

Groundfish Trawl tows range from 45 minutes to 20 hours.

2. **Duration of tow** – Tow duration can vary greatly. If a vessel is making long tows, over 3 hours, Observers will have plenty of time to sort and weigh samples. This allows one of the more precise methods to be used for estimating catch category weights. On the other hand, a vessel that hauls every hour or two reduces the options for weight estimates.

Groundfish Trawl tows range in size from 100 lbs to 40,000 lbs.

3. **Size of tow** – Vessel size and size of tow are related. Generally speaking, if a large vessel has a large tow, over 8000 lbs., it is possible to estimate discard weight by a volumetric estimate. If a small vessel has a large tow, the vessel may be sorting the catch overboard. This may necessitate the use of a visual estimate for the weight of a discarded catch category.

Groundfish Trawl tows can have as few as 5 species and as many as 45 species.

**Types of Crew Sorting on Groundfish Trawl Vessels:**

1. Crew sorts retained into bins or baskets while leaving discard on deck.
2. Crew sorts out a scupper – retained fish are taken out of the flow of fish while discards are flushed right off the vessel.
3. Crew sorts retained into bins or baskets and tosses or scoops discard overboard.
4. Crew presorts certain species.
5. Crew sorts from chute that discards fish directly over the side.

4. **Composition of tows** – Most tows encountered will have a large diversity of fish species. This is not necessarily a problem for experienced Observers that are able to identify species easily. However, the species composition of the tow will affect the sample size. If the vessel has a bag full of tiny thornyheads or flatfish, it may be necessary to reduce the sample size.
5. **Sorting technique of crew** – Each vessel will have a unique sorting method. Talk with the crew upon boarding to discuss how they sort and the best way to collect the samples. Communicating with the crew that samples will be collected from **discard only** is key to fulfilling sampling requirements.

All of the factors above are interrelated. For example, if a small vessel has a short tow duration and tows are large, the Observer will need to consider how each of these factors will affect sampling procedures.

## II. Collecting and Documenting Trip Information

Fishing Effort information includes where vessels are fishing, how long it takes fishers to catch fish, what fishers are attempting to catch, what type of gear is being used, and how much is being caught. All of this information is recorded on the Trip Form.

Groundfish trawlers are required to record fishing activities in a current NOAA Fisheries “Washington-Oregon-California Groundfish Logbook”. Observers copy this



record to complete the Trip Form for groundfish trawlers. Unfortunately, vessels targeting prawns/shrimp are not necessarily required to keep a Logbook. Most captains will keep a personnel log, however. Observers should ask to view this in order to record the required information. If the vessel does not document their activities, it may be necessary to collect this information personally.

### **Instructions for Completing the Trip Form on Trawl and Prawn Vessels**

An entry must be made for every tow a vessel makes. The Trip form is separated into two sections (See Figure 4-6 and 4-7):

Trip Form – Haul Locations

Trip Form – Hauls

Most of the information on the Trip form will not require sampling. The exception is the Observer Total Catch Estimate. Following the form instructions, procedures for obtaining Observer Total Catch Estimates on trawlers and prawn pot vessels is discussed.



**TIP \*** It is important for Observers to complete the Trip Form-Haul Locations after each haul. Some vessels may not fill in their Logbook until the steam in and/or record more or fewer hauls than actually occurred. If the Vessel Logbook is reviewed and copied after each haul, the risk of erroneous data recording is reduced.

*Trip Form – Haul Locations*

Starred (\*) topics below indicate information that can be obtained from the “Washington-Oregon-California Groundfish Logbook”.

- **Fishery Type** – Circle the fishery the vessel was participating in. If the vessel was participating in an EFP fishery, document the name of the EFP in the Trip Notes.
- **Page #** - All Trip Forms are numbered together. (If there are 5 Trip forms, number them 1 – 5.)
- **Coast Guard Number** – All Limited Entry groundfish trawl vessels and most prawn trawl vessels will have a six or seven digit USCG number. Request this number from the vessel skipper or a coordinator. **If the vessel does not have a USCG number, leave entry field blank and fill in the State Registration Number field.**
- **Trip Number** – This is an automatically generated number by the database. Complete this field once the trip has been entered in the database.



**Tip\*** Some Observers find it easier to start a trip prior to leaving port. Doing this allows the Observer to fill in the Trip Number while at-sea rather than when the Observer returns to port.

- **Observer Name** – Record your first and last name.
- **Year** – Record the year as YYYY.
- **Vessel Name** – Record the full name of the vessel.

**Question:** Why do Observers record the “Washington-Oregon-California Groundfish Logbook” page number?

**Answer:** The fishing locations of vessels carrying Observers are compared to the fishing locations of vessels not carrying Observers to ensure vessel activity has not changed with Observers on board.

- **\*“Washington – Oregon – California Groundfish Logbook” Number** - The Vessel Logbook number is the page number(s) that the skipper is recording the trip information on. The vessel Logbook number is on the lower left corner of the Logbook page. Do not record the number of the entire Logbook!



**Tip\***“Washington-Oregon-California Groundfish Logbook” Number is highlighted in gray (See Figure 4 – 4).

Vessel Name Example Departure: Date 7 6 96 Time 0400 Port Westport, WA  
 Federal Document No. 12345 Return: Date 7 8 96 Time 0600 Port Westport, WA  
 Crew Size (including Captain) 3 Buyer(s) Generic Seafoods

DATE mo/day	TIME local 24-hour clock	LATITUDE		LONGITUDE		Ave. depth of catch (fathoms)	NET TYPE	Target Strategy	Estimated pounds retained each tow - enter 4-letter code from species code list provided						
		Degrees	minutes	Degrees	minutes				SABL	DOVR	LEPN	SSPN	W00W	YTRK	
7/6	set	1300	47	58.7	125	47.3	500	B	DTS	300	4,000	500	100		
	up	1730	48	02.6	125	45.5									
7/7	set	0800	47	20.3	125	28.3	575	B	DTS	100	5,000	800	150		
	up	1400	47	46.4	125	34.4									
7/7	set	1800	46	52.6	124	53.2	90	M	W00W						
	up	2200	46	54.1	124	53.6							16,000	500	
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REMARKS:

Signed: John Doe

TO BE COMPLETED BY AGENCY  
 VESSEL \_\_\_\_\_ FISH RECEIVING TICKET NO. \_\_\_\_\_  
 PORT \_\_\_\_\_

**39761**

Figure 4- 4: Washington-Oregon-California Groundfish Logbook

- **Skipper First Name** – Record the first name of the skipper.
- **Skipper Last Name** – Record the last name of the skipper.
- **State Registration Number** – Use this field **only** if the shrimp or prawn vessel does not have a USCG number. The state registration number will begin with a CF in California, OR in Oregon, and WN in Washington. **This field will be blank on groundfish trawlers because they all have USCG numbers.**
- **Departure Date/Time** – Document the date and time the vessel left port.
- **Departure Port** – Document the port the vessel departs from.
- **Landing Date/Time** – Document the date and time the vessel returns to port.
- **Landing Port** – Document the port the vessel returns to.
- **Fish Tickets and State Agency Code** – Obtain the numbers of all landing receipts (fish tickets) from the vessel skipper, the port biologist, or the state liaison. **This is a required field for all fisheries and trips!** The state agency code will be C - for California deliveries, O – for Oregon deliveries, or W – for Washington deliveries.
- **Trip Notes** – Document any information pertinent to understanding the trip.
- **Haul/Set Number** – Number hauls consecutively, starting with 1 for each trip.

**Question:** Why are Observers required to record Fish Ticket Numbers?

**Answer:** When Observer data is analyzed, the total landed weight from the Fish Ticket is used to estimate the amount of discard by species per landed weight of target(s).

- **Start and End Date** – Document the date the haul was set and the date the haul was retrieved as MM/DD.
- **Start and End Time** – Document the Pacific Standard Time (PST) the haul was set and retrieved in 24-hour notation (military time). A haul starts when the net has reached fishing depth and ends when the brake is released and haul back begins.
- **Start and End Latitude** – Document the latitude (in degrees, minutes, 1/100<sup>th</sup> of a minute) that the haul was set and retrieved.

#### Loran

If the vessel is using Loran C, document the Loran coordinates. Send these to a coordinator in an Excel spreadsheet and they will return the latitude and longitude



**Tip\*** When an Observer boards a vessel that has a GPS, check to be sure the it's recording in degrees, minutes, 1/100<sup>th</sup> of a minute. If it's not, ask the captain to change the view to 1/100<sup>th</sup> of a minute instead of seconds. (See Figure 4 – 5)

- **Start and End Longitude** – Document the longitude (in degrees, minutes, 1/100<sup>th</sup> of a minute) that the haul was set and retrieved.



Figure 4- 5: GPS Showing Latitude and Longitude

**Fathoms:**  
1 Fathom = 6 Feet

- **Depth** – Document the fishing depth in **fathoms**. The “Washington-Oregon-California Groundfish Logbook” only requires the vessel to document the depth at which most of the fish were caught. If only one depth is documented, use it for both Depth fields.
- **Gear Type** – Enter a code for the gear type based on the configuration of the gear, not whether it’s fished mid-water or on the bottom. If the vessel is using a type of trawl gear not listed, please contact a coordinator for instructions.

- 1 - Groundfish Trawl, Footrope < 8 inches (small footrope)
- 2 - Groundfish Trawl, Footrope > 8 inches (large footrope)
- 3 - Midwater Trawl
- 4 - Danish/Scottish Seine
- 5 - Other Trawl Gear
- 11 – Prawn Trawl
- 12 – Shrimp Trawl, Single Rigged (one net)
- 13 – Shrimp Trawl, Double Rigged (two nets)
- 14 – All Net Gear Except Trawl
- 17 – Pineapple Trawl

**\*\*If the fishing vessel is not using one of the above gear types, this is most likely the wrong section of the manual. Please refer to Chapter 5 – Fixed Gear.\*\***

- **Target Strategy** - Enter the vessel’s target strategy. Refer to Appendix E for a list of target strategies. If the vessel is recording more than one target strategy on a single haul, record the strategy that has the largest representation in the catch. Document in the comments other recorded target strategies.

LE      OA      \_ EFP

USCG #

Trip Number

Vessel Name \_\_\_\_\_

Logbook # \_\_\_\_\_

Skipper First Name \_\_\_\_\_

Skipper Last Name \_\_\_\_\_

State Registration # (OA only) \_\_\_\_\_

Departure Date/Time \_\_\_\_\_

Departure Port \_\_\_\_\_

Landing Date/Time \_\_\_\_\_

Landing Port \_\_\_\_\_

Fish Tickets

State Agency Code

Trip Notes: \_\_\_\_\_

**TRIP FORM - HAUL LOCATIONS**

Observer name \_\_\_\_\_ Year \_\_\_\_\_

Page \_\_\_\_ of \_\_\_\_

Haul/ Set #	DATE	TIME (24-hour clock)	LATITUDE		LONGITUDE		Depth of catch (fathoms)	Gear Type	Target Strategy
			Month	Day	Degrees	Minutes			
	Start <sup>1</sup>								
	End <sup>2</sup>								
	Start <sup>1</sup>								
	End <sup>2</sup>								
	Start <sup>1</sup>								
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	End <sup>2</sup>								
	Start <sup>1</sup>								
	End <sup>2</sup>								

Start<sup>1</sup> - Time the brake is set    End<sup>2</sup> - Time the brake is set

Figure 4-6: Trip Form – Haul Locations

*Trip Form – Hauls Instructions*

- **Haul/Set Number – Document the haul/set number** that corresponds to the Haul Location information on the front of the form.
- **Observer Total Catch Estimate (OTC) –** Record the total catch estimate to two decimal places. Observer Total Catch estimate is recorded in pounds.
- **Volume of Codend or Trawl Alley/Bin –** Document the volume of the codend or bin/rawl alley, to two decimal places, when weight methods “2 – Bin/Trawl Alley Estimate” or “10 – Codend Estimate” are used to determine Observer Total Catch Estimate.
- **Density –**Record density, to two decimal places, when weight methods “2 – Bin/Trawl Alley Estimate” or “10 – Codend Estimate” are used to determine Observer Total Catch Estimate.
- **Weight Method –** Enter the number for the weight method used to obtain the Observer Total Catch Estimate. The weight methods that may be used for Trawl/Prawn Pot OTC’s are as follows:
  - 1 - Actual Weight
  - 2 - Bin/Trawl Alley Estimate
  - 3 - Basket Weight Determination
  - 4 - Visual Estimate
  - 6 – Other
  - 7 - Vessel Estimate



## 10 - Codend Estimate

## 11 – Retained + Discarded

**Question:** If pots are lost, do I document the number of pots originally set in the Total Hooks/Pots column or the number there were after some were lost?

**Answer:** Document the total number of pots originally set.

- **Total Hooks/Pots** – Document the total number of pots in the set on **prawn pot vessels**. This column will be blank on groundfish and prawn/shrimp trawlers.

- **Gear Performance** – Record one of the following codes to document gear performance.

1 - No problem

2 - Pot was in the haul

3 - Net hung up

4 - Net ripped

5 - Trawl net or codend lost, pot(s) lost, other gear lost

7 – Other problem – Document other gear related problem in the comments section

- **Beaufort Scale** – This is not a required field at this time. Do not fill in unless otherwise directed by program staff.
- **Comments** – Document any information that is important about the haul. If the vessel documented more than one target strategy, list other strategies in this column.
- **OTC Keypunch Check** – This is required for the Observer Total Catch Estimate field. Add all of the OTC's for an entire trip and record total weight of trip in the OTC keypunch check box (If there is

more than one Trip form, add total catches of ALL hauls to obtain keypunch check.).

- **Total Hooks/Pots Keypunch Check** – On prawn/shrimp vessels, this is required for the Total Hooks/Pots field. Add all of the Pot counts for an entire trip and record total pot count of trip in the Total Hook/Pot keypunch check box (If there is more than one Haul form, add total pot counts of ALL hauls to obtain keypunch check.)

**TRIP FORM - HAULS**

Weight UM: LBS

Volume UM: M<sup>3</sup>Density UM: LBS/M<sup>3</sup>

Haul/ Set #	Observer Total Catch Estimate	Volume of Codend or Trawl Alley/Bin	Density	Weight Method	Total Hooks/ Pots	Gear Perf	Beaufort	Comments
Key- punch Check								

Figure 4- 7: Trip Form – Hauls

## Observer Total Catch Estimates (OTC)

As mentioned earlier, it is necessary to sample in order to obtain an independent OTC. OTC's should be obtained for all hauls!! Although there are eight weight method options for OTC on Trawlers and Prawn Pot vessels, only three of them are commonly used. In order of preference, the weight methods commonly used for OTC on Trawl and Prawn Vessels are:

- Weight Method 2 - Bin Volume/Trawl Alley Estimates
- Weight Method 10 – Codend Estimates
- Weight Method 4 – Visual Estimates

### *Volumetric Estimates*

There are two weight methods that employ volumetric estimates:

- 2 – Bin Volume/Trawl Alley Estimates
- 10 - Codend Estimates

Volumetric estimates for OTC should be made on all groundfish trawlers and prawn pot vessels unless:

- The codend is irregular in shape, such as a blob, and it is not dumped into a bin/alley.
- Codend is irregular in shape and is dumped into a bin/alley but the height of fish in the bin/alley is too low to take a good measurement.
- Vessel or weather conditions make volumetric estimates unsafe.

Prawn Pot Vessels OTC estimates will most likely not employ volumetric estimates because of how the catch is handled.

Bin/Trawl Alley estimates are much easier, produce better results, and are safer to take than Codend estimates. If there is more than one way to estimate the OTC, use the Bin/Trawl Alley estimate rather than Codend estimate.

There are two steps in obtaining volumetric estimates.

1. Obtain the volume of the codend or bin/trawl alley where the fish reside.
2. Obtain a density for the fish.

### **Trawl Alley or Checker Bin Estimates**

1. **Determine the appropriate volume formulas for each area of the bins and trawl alley.** Most bins and trawl alley will be rectangular, however, some will have odd shaped areas (See Figure 4-8 and Figure 4-9).
2. **Measure the area of the empty bins and trawl alley in meters.** It is easiest to measure the area of the bins and trawl alley prior to leaving the docks. If the bins and trawl alley have easily definable sections, measure them independently. Often times, a catch only fills up a portion of the total area. From these measurements, the total area of the bin will be available.



$$\text{Total Area (m}^2\text{)} = \sum \text{Areas (m}^2\text{) of all bins}$$

3. **Measure the height of the catch in the bin in meters.** The height of the fish in the bin provides the final dimension needed to obtain the volume of the catch. Height is measured by placing a calibrated stick into the bin to measure the depth of fish at one or several points. If the height of fish varies throughout the bin, multiple height measurements should be taken. If multiple heights are measured:



$$\text{Average Height of Fish in Bin (m)} = \frac{\text{Height A (m)} + \text{Height B (m)} + \text{Height C (m)} + \dots}{\text{\# of Height Measurements Taken}}$$

4. **Calculate and record catch volume.** Record measurements and calculations on the back of the Catch form. Make sure that all of the measurements are as precise as possible and describe the methods in the Observer Logbook. To obtain volume of the catch:



$$\text{Volume of Catch (m}^3\text{)} = \text{Total Area of Bin (m}^2\text{)} \times \text{Average Height of Fish in Bin (m)}$$

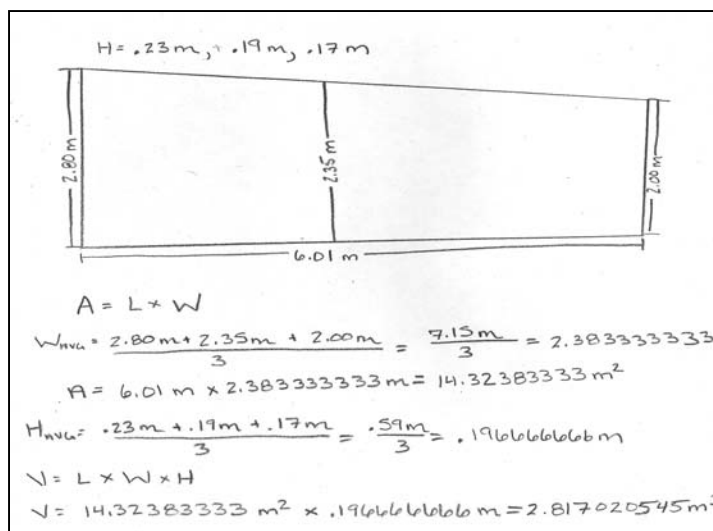


Figure 4- 8: Bin Volume Calculation



Figure 4- 9: Trawl Alleys and Bins

## Codend Estimates

When measuring a codend, always remember that **safety is the first concern** (See Figure 4-10). Nets tend to slide and roll. Be careful not to get caught between the net and the trawl alley. Ask crewmembers for assistance; their help will make the task easier and safer. Follow the steps listed below to take an accurate codend measurement.

1. **Determine the appropriate geometric shape(s) and decide on the appropriate formula(s) to use.** Using the formula, determine which dimensions will be measured in order to obtain a volume. Refer to “Area, Volume, and Product Formulas” in Appendix I. for the formulas required to calculate the various volumetric shapes.
2. **Measure the various dimensions of the codend using actual measurements and/or reference points.** Take height and width measurements from several segments to obtain an average height and width for the net. It may be necessary to acquire a long stick, or a similar item, and mark it for use as a height gauge. When sighting across the net for a height, the Observer's eyes should be level with the top of the net.
3. **On the back of the Catch form, record the method, formula, dimensions, and calculations used in obtaining the volumetric estimate.** To calculate the total volume of the codend:



$$\text{Volume (m}^3\text{)} = (.7854) \text{ L(m)} \times \text{W(m)} \times \text{H(m)}^*$$

\*Most measurable codends require the use of the ellipsoidal formula above. This is used as an example formula and is not the formula used for every codend shape.





Figure 4- 10: Codends

### *Measuring Large Codends*

Occasionally, a full codend is larger than the trawl deck and must be brought on board and emptied in several sections. To determine the codend volume in this situation, measure the codend sections that are brought onboard. Use the reinforcing cables, or “expansion straps” around the circumference to divide the codend into sections. Determine a volume for each segment of the net measured and add them together for a total volume of the codend. Do not apply a predetermined or constant volume to the number of codend segments to calculate the OTC!

### **Obtaining Densities for Total Catch Calculations**

Once the volume of bin/alley or codend has been obtained, it will be necessary to determine the density of fish in that area. Density is weight per unit of volume. For our purposes, it is expressed in pounds per meter<sup>3</sup>. Densities will need to be estimated from each haul where a bin/alley or codend estimate is used for OTC estimate.



$$\text{DENSITY} = \text{WEIGHT (LBS)} / \text{VOLUME (M}^3\text{)}$$

### *Density Requirements*

It is necessary to measure both the volume and weight of a sample of the catch to estimate density. The Observer baskets are an excellent density container. Use **TWO** or more Observer baskets for the density sample for each volumetric estimate. Densities should be taken for every volumetric estimate. When taking density samples:

- Be sure to take a random sample of unsorted catch. Document random sampling method in the Observer Logbook.
- Take the sample prior to any sorting of fish.
- Try to minimize the interstitial spaces and fill the containers to the same level.
- If using Observer baskets, fill them all the way to the top (.044 m<sup>3</sup>) or to the top of the last line of holes (.032 m<sup>3</sup>). (See Figure 4-11)
- Weigh each density basket and record this weight on the deck sheets.
- Document calculations used to determine density on the back of the Catch form. Be sure to include the formulas used.

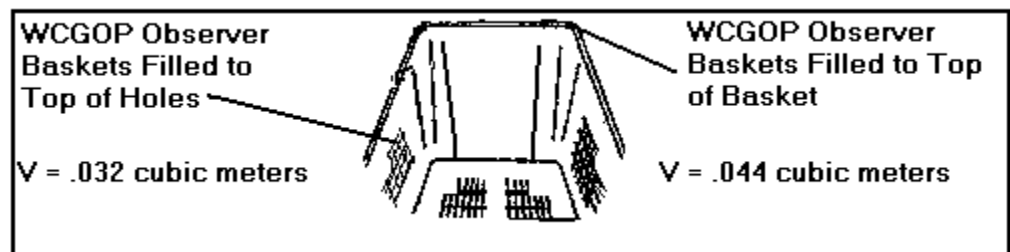


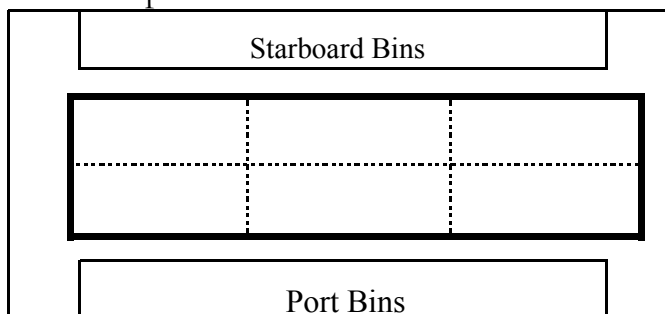
Figure 4- 11: Observer Basket Volumes

### *Procedure for Calculating Density*

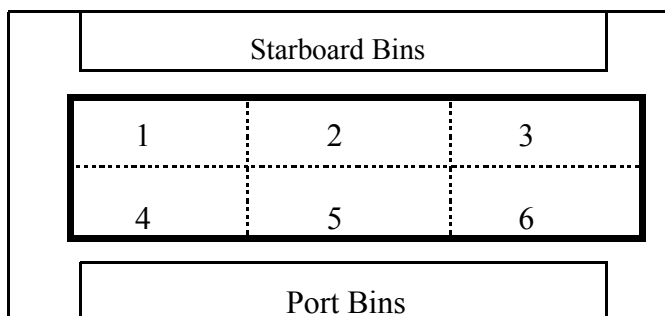
After the codend is dumped or after the height measurements for bin/alley estimates have been completed, randomly select area(s) to take density baskets. Below is an example on how to implement random selection for density baskets.

1. Split the trawl alley into sections of equal size.

For example:



2. Number the sections



3. Use a clock or numbered pieces of paper to determine which section(s) to take the sample from. It's better to take baskets from two randomly selected sections than just one due to the possibility of stratification.



**TIP\*** Use a clock by assigning each section a ten second time period (i.e. section one equals 0-9 seconds) and then glance at the watch twice to determine which sections to take baskets from. Or tear up six pieces of paper, number them 1-6, and pick two prior to the haul back.

3. Fill baskets to either the top of the holes in the basket or the top of the basket. Use individuals from selected section(s). Working from one corner of the section, take all of the fish, working down to the deck until the basket is “full”.
4. Weigh baskets.
5. Determine the average basket weight.



$$\text{Ave Basket Wt(lbs)} = \frac{\text{Wt of Basket A(lbs)} + \text{Wt of Basket B(lbs)}..}{\# \text{ of Baskets weighed}}$$

6. Determine the density of the catch.



$$\text{Density (lbs/m}^3\text{)} = \frac{\text{Average Weight of Baskets (lbs)}}{\text{Volume of Basket (m}^3\text{)*}}$$

\*The volume of the basket is a known. The volume of a basket filled to the top of the holes equals .032m<sup>3</sup> and the volume of a basket filled to the top equals .044m<sup>3</sup>.

### OTC Calculation

Use the bin/alley or codend volume and the density to calculate OTC.



$$\text{OTC(lbs)} = \text{Vol. of Codend or Bin/Alley(m}^3\text{)} \times \text{Density (lbs/m}^3\text{)}$$

**Review of Steps for Obtaining a Volumetric OTC (See Figure 4-12):**

1. Codend is brought aboard. If using bin/trawl alley volumes, codend is dumped in trawl alley or bins.
2. Decide which formula best describes codend or bin.
3. Take all length, height and width measurements required for the formula.
4. Take a minimum of two baskets of randomly selected, unsorted catch for densities.
5. Multiply density by the volume of codend or bin/alley to calculate OTC.

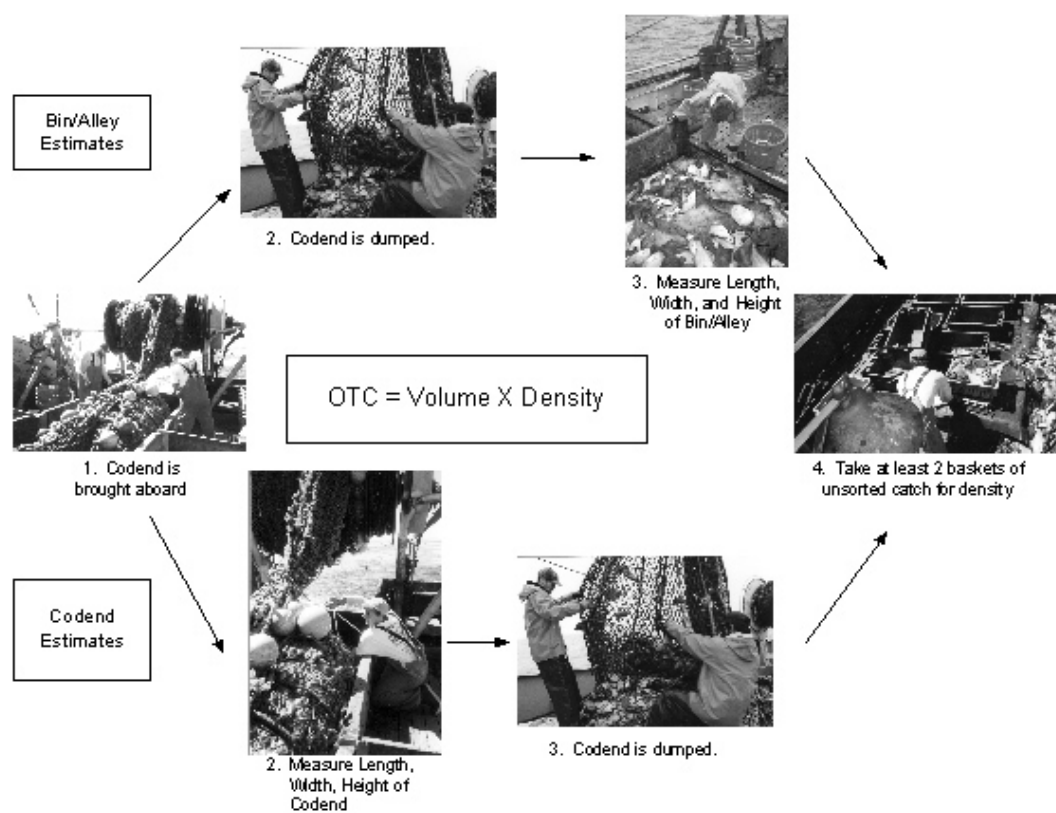


Figure 4- 12: Schematic of discard sampling on a trawl vessel

## Visual Estimates

Observers must do visual estimates of OTC for every haul on net vessels. Record the visual estimate on the back of the Catch form. Visual estimates will only be recorded as the OTC if a volumetric estimate is not possible.

## Other Acceptable OTC Methods

As mentioned earlier, there are five more weight methods that can be used for total catch estimates.

*Weight Method 1* – Actual Weight

*Weight Method 3* – Basket Weight Determination

*Weight Method 6* – Other

*Weight Method 7* – Vessel Estimate

*Weight Method 11* – Retained + Discarded

### ***Weight Method 1 – Actual Weight***

If all of the catch is weighed, then an actual weight has been obtained. This is not a preferred weight method because the analysts can sum the catch category weights to get the same value. Therefore, recording visual or volumetric estimates of OTC provides a second piece of data to the analysts.

### ***Weight Method 3 – Basket Weight Determination***

All of the individuals within a haul are placed in Observer baskets. Only portions of the baskets are actually weighed (5 baskets out of 10 baskets for instance). An average basket weight is applied to the total number of baskets filled. This method is rarely used for OTC because it requires basketing UNSORTED catch that cannot be used for later samples (all other samples MUST come from sorted catch).



***Weight Method 6 – Other***

The most common reason this method is used is when a combination of two weight methods is used. This could happen when a vessel dumps part of a codend on deck and the Observer gets a volumetric estimate while some of the catch is discarded at sea and is visually estimated.

This weight method should only be used when the other weight methods cannot be applied. If this method is used, document the circumstances in the Observer Logbook and on the paperwork.

***Weight Method 7 – Vessel Estimate***

The vessel estimates how much is caught by catch category. This weight method should only be used when the Observer is unable to obtain an independent estimate. Remember, vessels do not document total catch weight so the Observer must ask them for an estimate.

***Weight Method 11 – Retained + Discarded***

All of the catch categories on the Catch Form are added together to obtain an OTC. This method is used when obtaining a volumetric estimate is impossible AND a visual estimate was not done. This method should be rarely, if ever, used **on net vessels** and an explanation of why this method was used should be in the Observer Logbook.

**OTC's on prawn pot vessels will often be estimated using this method.**

**General Rules for the Recording of OTC**

- Any time a volumetric estimate is taken for OTC, use it!!!!
- If the catch was weighed and the volumetric estimate determined, record the volumetric estimate for the OTC.

- Never record an actual weight for the OTC estimate. The visual estimate should be recorded before an actual weight.

### III. Sampling Catch

After the density baskets are taken, THE CREW will sort the catch into retained and discarded. They will place the retained catch in baskets, bins, or other holding containers and either remove the discard from the vessel or relocate it to a location out of their way. Each state has port samplers who obtain information from the retained catch at delivery. **Therefore, the Observers primary responsibility is to sample the discarded portion of the catch.**

#### Catch Categories

Chapter 3 discussed catch categories briefly. This section provides a review and more specific information regarding catch categories on groundfish trawl and prawn pot vessels. There are two rules that always apply to catch categories:

1. Retained and discarded individuals are always in separate catch categories.
2. Pacific halibut is always in it's own catch category.

#### *Retained Catch*

The crew places retained species in catch categories and on groundfish trawlers records them in the “Washington – Oregon – California Groundfish Logbook”. When observing on groundfish trawlers, always record retained catch categories exactly the same as in the Logbook unless:

- Vessel does not record catch category (often happens with species retained in small quantities)

- Vessel uses an invalid PacFin code (Select most applicable name from Catch Category list in Appendix E)

There may be instances when Observers sample retained catch **but it should only be done when a complete and comprehensive sample of the discard has been taken.** When sampling retained catch, keep species in the same catch categories as the vessel has them in.

The priority for sampling retained catch categories is:

1. Species not recorded by the vessel
2. Mixed Species - A lot of vessels will mix flatfish or rockfish species. If the crew is mixing species, take a species composition sample from the mixed group and do not separate the species into their own catch categories!!

### *Discarded Catch*

The amount of fish discarded on trawlers is extremely variable, from close to 0% to 100%. In some circumstances, the Observer will not be able to weigh the entire discard. Catch categories allow for the sorting of specific species or groups of species out of the whole (See Figure 4-13). This allows extremely accurate weights to be obtained for some of the discarded catch categories while using a less accurate method for the rest of the discard. Generally, importance is placed on prohibited species, rockfish, and other overfished species. A discussion of sampling priorities follows the explanation of estimating catch category weight.

There are three factors that distinguish catch categories from each other on trawl and prawn pot vessels:

- Vessel Sorting – If the entire discard is not weighed and the crew sorts species different

## Vessel Sort Example:

Often vessels will presort some species. This means they remove them from the deck immediately. Presorted species would fall into a separate catch category than those not presorted.

ways, then the species will fall into catch categories based on the way the crew sorted them.

- **Weight Method** – The method used to obtain the weight estimate of the catch category is the primary factor when determining the number of discarded catch categories. If portions of the catch have different weight methods this requires them to be in different catch categories.
- **Sample Method** – If species have the same weight method but are sampled for species composition differently, this also requires them to be in different catch categories.

When sampling, the primary sort will be to catch category. Observers must make an estimate of the weight of each discarded catch category. See Appendix E for a listing of catch categories.

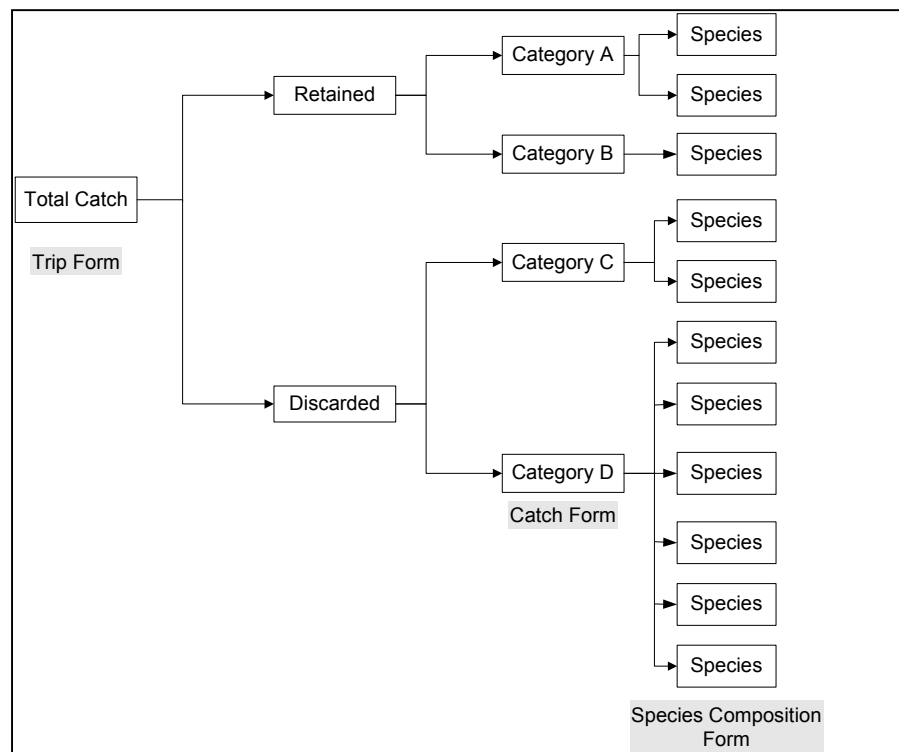


Figure 4- 13: Components of the Catch

## Methods for Estimating Catch Category Weights

There are 10 weight methods that can be used to determine catch category weights on trawlers and prawn vessels.

- 1 - Actual weights
- 2 – Bin Volume/Trawl Alley Estimate
- 3 - Basket Weight Determination (BWD)
- 4 - Visual Estimate
- 5 - OTC – Retained
- 6 - Other
- 7 – Vessel Estimates (Retained only)
- 8 – Extrapolation
- 9 – Pacific Halibut length/weight
- 10 – Codend Estimates

The weights obtained by these methods are recorded on the Catch form.

### ***Weight Method 1 – Actual Weights***

1. Place all of the individuals from the catch category in Observer baskets.
2. Weigh baskets. There will be one catch category for all of the species in the baskets.



$$\Sigma \text{ Baskets weights (lbs)} = \text{Total weight of catch category (lbs)}$$

OR

1. Sort all of the individuals in the catch category by species.
2. Weigh each species group.



$$\text{Catch Category Wt} = \sum \text{All species groups in catch category}$$

### ***Weight Method 2– Bin Volume\Trawl Alley*** **Estimates**

1. Take measurements of the trawl alley and/or bins.
2. Multiply measurements by appropriate volumetric formula.
3. For each bin measured, take a minimum of two density baskets.
4. Find the average weight of the density baskets, then divide by the volume of one basket to get density (lbs/m<sup>3</sup>).



$$\text{Total Vol (m}^3\text{) X Density (lbs/m}^3\text{) = Total Wt of catch category (lbs)}$$

Refer to the section on volumetric estimates for OTC for more detailed instructions.

### ***Weight Method 3– Basket Weight Determinations (BWD)***

1. Visually estimate the number of baskets it will take to hold the entire catch category.
2. Devise a sampling plan to randomly select baskets to use for average basket weight determination. Use a spatial, systematic, or temporal frame.  
***Specifics on implementing each type of***

*sampling frame are in “Methods to Randomly Select Baskets”.*

3. Place **all** catch into baskets to obtain the total basket count. Each basket should be filled to the same level and contain a random sample of discard.
4. Weigh each randomly selected basket. **A minimum of four baskets must be weighed when using the BWD weight method** but observers are encouraged to weigh at least 6 – 10 baskets.
5. Calculate average basket weight. Use this weight to calculate weight of all full baskets.
6. If a partial basket remains, record the weight and add it to the calculated BWD estimate.
7. All of the species in the baskets will be included in one catch category.



$$\text{Ave. Basket Weight (lbs)} = \frac{\sum \text{Basket Weights}}{\text{Number of Baskets Sampled}}$$



$$\text{Catch Category Wt.} = (\# \text{ of Full Baskets} \times \text{Ave Basket Wt}) + \text{Wt. Partial Basket}$$

## Method to Randomly Select Baskets

### Systematic (preferred)

- a. Break the catch category into sampling units (n) by dividing the visually estimated number of total baskets by the number of baskets to be used for average weight baskets. For example, there are 15 baskets and 5 are going to be sampled resulting in a sampling unit of 3 (15/5).

- b. Choose which skate to start sampling from by selecting a random number between 1 and the sample unit (n).
- c. Take the nth basket for average weights and every n<sup>th</sup> basket after that.

### Systematic Random Sampling Frame

#### Example:

The Observer estimates that the total number of baskets it will take to hold the entire catch category is 12. At least four baskets need to be weighed. A random sampling frame is designed as follows:

1. Visual estimate # of baskets/# of baskets want to weigh:  $12/4 = 3$  (This means that one of every three baskets is taken to weight)
2. Using the random number table, a number between 1 and 3 is selected: 2
3. Observer collects the following baskets for weight: 2, (2+3), (5+3), and (8+3).

### Spatial

- a. Visually divide area holding catch category into equal units.
- b. Randomly select 1 or more units to take average weight baskets from.
- c. Baskets filled from randomly selected area are used for average weights.



## Temporal

- a. Estimate the amount of time it will take to sort through catch.
- b. Randomly select individual minutes within sort time.
- c. Baskets being filled during randomly selected minutes are used for average weights.

### *Weight Method 4 – Visual Estimates*

Visual estimates are the least preferred option for obtaining a catch category weight but are sometimes the only option available. Visual estimates fall into two categories. There are visual estimates where a “known” is used to determine the total catch category weight and visual estimates where the Observer makes the best possible determination based solely on experience.

Visual estimates can be used for large amounts of mud, rocks, and miscellaneous junk.

**Visual Estimates based on a “known”** - There are three acceptable methods for obtaining visual estimates based on a “known” value.

- **Basket Estimate** - Estimate the number of baskets it would take to hold the entire catch category to obtain an estimate of catch category weight.

A **subsample** is a portion of a population. It can be used to make inferences about the population as a whole if collected in a random fashion.

1. Take a representative random **subsample** of the catch category using a spatial, systematic or temporal frame. (See discussion on random selection of baskets for Weight Method 3 for more detail)
2. Weigh each subsampled basket.
3. Derive the average basket weight for the catch category.

4. Visually estimate the number of baskets it would take to hold the entire catch category and multiply by the average basket weight.



$$\text{Catch Category Wt} = \text{Ave Basket Wt (lbs)} \times \text{Visual Estimate of Total \# of baskets}$$

- **Spatial Estimate** - Estimate the weight of a catch category by taking a subsample of the discard from a randomly selected spatial unit.

1. Visually divide area holding catch category into equal units.
2. Randomly select 1 or more units to take average weight baskets from.



**TIP \*** Remember, baskets must be taken from SORTED catch!

3. Visually estimate the portion or fraction of the total discard that was taken from the subsample.
4. Weigh subsample.



$$\text{Catch Category Wt} = \frac{\text{Weight of subsample (lbs)}}{\% \text{ of total area subsample represents}}$$

- **Temporal Estimate** - Estimate the time it would take to sort the entire catch in relation to a subsample to obtain an estimate of catch category weight. Temporal estimates can be used when vessel is sorting discard out a scupper.
1. Estimate the amount of time it will take for crew to sort catch.

2. Randomly select a time unit to take a subsample from.
3. Weigh subsample.



$$\text{Catch Category Weight} = \frac{\text{Wt of subsample (lbs)}}{\text{Time to take subsample (min)}} \times \text{Total time for vessel to sort catch}$$



**TIP\*** Temporal Estimates can be used when vessel is sorting discard out a scupper.

### Visual Estimates Based Solely On Experience

This method will be employed when Observers are unable to use a “known” value to determine total catch category weight. An example of when to employ this method is for codends that are fully or partially dumped at-sea. Observers will be unable to take any measurements or “known” values for the codend. Base the visual estimate on codends seen in the past.



**Tip\*** If a catch category does not have a species composition sample, use the most descriptive PacFin code possible.

### Weight Method 5 – OTC – Retained

This weight method is to be used ONLY if the discarded catch is not sampled due to illness or injury.

- Estimate OTC - It is preferred *Weight Method 2 – Bin/Trawl Alley Volume* or *Weight Method 10 – Codend Estimate* be used.
- Estimate weight of retained fish using one or more of the weight methods.



$$\text{Catch Category Wt(lbs)} = \text{OTC} - \text{Retained Species Wts(lbs)}$$

### ***Weight Method 6 – Other***

The most common reason to use this method is when a combination of two weight methods is used to determine catch category weight. This weight method should never be intentionally used. It creates confusion to end users and debriefers because it does not give an accurate idea how the catch category weight was actually derived. If this method is used, document what was done in the Logbook and on the paperwork.

### ***Weight Method 7– Vessel Estimates***

This weight method is used for **retained fish** only. Groundfish trawlers are required to record retained weights in their “Washington-Oregon-California Groundfish Logbooks”. **Since discard is the priority, Observers usually use this weight method for all or most of the retained fish on groundfish trawlers.** If a vessel is not making estimates of retained catch, one of the other weight methods must be used to make these estimates.

- Copy retained catch category estimates from “Washington-Oregon-California Groundfish Logbook”.
- Ask skipper for retained catch category estimate.

### ***Weight Method 8 – Extrapolation***

#### **Presort –**

Vessels will attempt to get harder fish back into the water quickly. After a codend has been dumped, the crew will sort through the catch, pulling out individuals of these species and toss them over. This usually happens prior to any other sorting of catch.

This weight method is commonly used for fish that are **presorted** in the trawl fishery. The most common presorted species are Pacific halibut, sablefish, and lingcod.

1. Count the number of individuals, by species.
2. Devise a sampling plan to randomly select individuals for average weights. Use a systematic, spatial, or temporal frame. **Specifics on**

implementing each type of sampling frame are in “Methods for Randomly Selecting Individuals.



**TIP\*** A minimum of 15 individuals should be collected for average weights. For species caught in large quantities, count and weigh at least 50 individuals

3. Apply the average weight to the total number of individuals of that species caught to obtain the catch category weight.



$$\text{Average Weight} = \frac{\text{Sum of individuals weighed (lbs)}}{\text{\# of individuals weighed}}$$



$$\text{Catch Category Wt} = \text{Average Weight} \times \text{Total number of individuals caught}$$

### *Methods for Randomly Selecting Individuals*

#### **Systematic Selection (preferred method)**

Select individuals based on when they leave deck.

##### **Systematic Random Sampling Frame Example:**

The Observer estimates that 60 Sablefish are usually presorted. In order to get 15 individuals, he divides  $60/15 = 4$ . That means that one of every four fish should be taken for average weights. Using the random number table, a number between 1 and 4 is randomly selected. A 3 is selected. The Observer collects the 3, (3+4), (3+7)...individuals for average weights.

1. Estimate number of fish of particular species caught.
2. Break the number of fish into sampling units (n) by dividing the number of fish needed for average weights by the number of fish likely to be on deck.
3. Choose which fish to take first by selecting a random number that is between 1 and the sample unit (n).
4. Collect the  $n^{\text{th}}$  fish. Then collect every  $n^{\text{th}}$  individual after that.

5. Weigh selected individuals. Obtain an average weight per individual using the following equations:

### **Spatial Selection**

Select all individuals from a designated area on the deck.

1. Visually divide the deck into equal units.
2. Randomly select a unit to take individuals from.
3. Take all individuals in that unit.
4. Place all selected individuals in baskets.

### **Temporal Selection**

Select all individuals sorted or on deck during a unit of time.

1. Estimate the time it will take to sort out species.
2. Randomly select a designated time during sort to take individuals or randomly select a time to begin taking individuals.
3. Take all individuals during randomly selected interval or take individuals until enough have been collected.

### ***Weight Method 9 – Pacific halibut Length/Weight***

This weight method is used ONLY for Pacific halibut.

1. Visually estimate or Actually Measure the length for each Pacific halibut caught.
2. Use the Pacific halibut length/weight conversion table to obtain a weight for each individual (see Appendix J).
3. Sum the weight of all the Pacific halibut.



Catch Category Wt(lbs) =  $\sum$  Pacific Halibut Wts from Length/Weight Conversion Table

### Weight Method 10 – Codend Estimates

If a codend estimate was done for OTC and all of the catch was discarded, this method is used. This rarely occurs! Refer to the section on volumetric estimates for OTC's for detailed instructions.



$$\text{Catch Category Wt} = \text{Volume (m}^3\text{)} \times \text{Density (lbs/ m}^3\text{)}$$

### Weight Method Guidelines

Due the variety of circumstances Observers face, it is difficult to give definitive guidelines for when to use each weight method. Remember, it may be necessary to use more than one method for each tow. As a guide, here are some general rules.

- If the total discard weight is less than 500lbs, the discard weight estimate should be obtained by an actual weight.
- If the total discard weight is less than 1500lbs, the discard weight estimate should be obtained by Basket Weight Determination.
- If a discarded catch category is held within a bin or trawl alley, a volumetric estimate should be used to determine the catch category weight.
- If an actual weight, basket weight determination, or volumetric estimate cannot be taken for a catch category weight, a visual estimate should be used.

## Sampling Priorities

Certain discarded catch is rated as a higher priority than other discarded catch. When time permits, Weight Method 1 - Actual Weights, should be used for catch categories containing:

- Prohibited species – Pacific Halibut, salmon species, and Dungeness crab (North of Point Arena)
- Overfished Species – Cowcod, Dark-blotched rockfish, Pacific Ocean Perch, Lingcod, Canary rockfish, Yelloweye rockfish, Bocaccio rockfish, Widow rockfish (Not Pacific hake)
- Rockfish species
- Species that are both retained and discarded – Because some species are high-graded or have size restrictions, a sample of the discarded individuals is very important.

## Catch Form

The Catch Form is the standardized form used to document Catch Weight and Catch Weight methods. A Catch Form should be completed for all hauls (See Figure 4-14).

### *Catch Form Instructions*

- **Haul Number** – Record the number of the haul.
- **Date** – Record the date as MM/DD/YY.
- **Trip Number** – Record the trip number generated by the database system.



- **Coast Guard Number** – Record the USCG vessel number for Limited Entry trawlers and fixed gear vessels (if they have one). If the vessel does not have a USCG number, leave this field blank.
- **Catch #** - Number the catch categories consecutively, starting at 1 for each haul. The numbers on the paper Catch Form must match the numbers assigned by the database when data is entered.
- **R or D** – Record whether the catch category is from retained or discarded catch. Record with an R – Retained or D – Discarded.
- **Catch Category** – Record in capital letters the catch category sampled in the 4-letter PacFin code. For a list of PacFin catch category codes, see Appendix E.
- **Weight** – Record the total weight of the catch category to two decimal places. Weight unit is pounds (lbs).
- **Volume** – If the catch category is estimated volumetrically (bin, trawl alley, or codend), record the measured volume in  $m^3$ . Record entry to two decimal places.
- **Density** – If the catch category is estimated volumetrically (bin, trawl alley, or codend), record the density used in  $lbs/m^3$ . Record entry to two decimal places.
- **Number of Fish** – Record the total number of fish in the catch category if weight methods 4 – Visual Estimate, 8 – Extrapolation, or 9 – Length/Weight Conversion were used. Do not

**Record numbers of fish for Weight Method 4 – Visual Estimate** when the actual count of individuals has been done.

**Do not record extrapolated numbers on the Catch form.**

record the total number of fish for weight methods other than 4, 8, and 9.

- **Weight Method** – Document the weight method used to estimate the catch category weight.

1 - Actual Weight

2 - Bin Volume/Trawl Alley Estimate

3 - Basket Weight Determination

4 - Visual Estimate

5 - OTC-Retained

6 - Other

7 - Vessel Estimate

8 - Extrapolation

9 - Length/Weight Conversion  
(Pacific halibut only)

10 - Codend Estimate

- **Catch Purity** – Record as P – Pure if the catch category is composed of 95% or greater a single species or as M – Mixed if the catch category is composed of less than 95% a single species.

- **Discard Reason** – Record the skipper's/crew's reason for discard for unsampled (no species composition sample taken) discarded catch categories only.

1 - Prohibited – Only Salmon, Pacific Halibut, and Dungeness Crab.

2 - Size – High-graded fish.

3 - Market – Any market driven reason such as size (too big or small), no market, market price is too low, etc.



**TIP\*** Species which are unlikely to be retained, such as eelpouts, sculpins, and grenadiers are given a reason for discard of '3 - Market'.

4 - Regulation – Any regulatory reason including size, over quota, etc.

5 - Other – Document in comments actual reason for discard.



**Tip\*** Invertebrates such as starfish, anemones, and sea pens are given a reason for discard of '5 - Other'.

7 – Predation – Caught fish that are eaten by any predator including marine mammals, seabirds, or sand fleas.

- **Vessel Estimate** – Fill in the vessel estimate (from the Vessel Logbook) in this column ONLY if an independent estimate of the catch category weight was taken. If the weight method for the catch category is 7 – Vessel Estimate, leave this column blank and fill in the vessel estimate in the catch weight column.
- **Comments** – Document anything important about each category. Important information could include the composition of a mixed (less than 95% pure) unsampled catch category. For example, if the skipper documents a retained

catch category as REX and the rex sole is mixed with sand sole, make a note of this in the comments column.

- **Keypunch Checks** – This is a required field for **Catch Weight** and **Catch Numbers of Fish**. Sum up the entries in each column and place the total in the corresponding keypunch box at the bottom of the form.

4-53

## IV. Collecting and Documenting Species Composition

Once the catch has been placed into catch categories, a species composition sample can be taken from all, a few, or only one of the catch categories (See Figure 4 – 16). Species composition samples can consist of every individual in the catch category or be a subsample of the individuals in the catch category. Subsamples must be:

1. Representative of the entire catch category.

Methods for Species Composition Sampling:

### *Sample Method 1 - Whole Haul*

**If Weight Method 1 – Actual Weights and Sample Method 1 – Whole Haul** are used and the whole haul weight is different than actual weight, record the whole haul weight on the Catch Form.

1. Sort all individuals in catch category to species.
2. Weigh and count all individuals by species.

### *Sample Method 2 - Single Basket Subsample*

1. Randomly take one representative basket from the catch category.
2. Sort individuals in basket to species.
3. Weigh and count all individuals by species.

### *Sample Method 3 - Multiple Basket Subsample*

1. Randomly take two or more representative baskets from catch category.



**TIP\*** Keep track of the number of baskets used in the species composition sample. It is necessary to record the actual or estimated number of baskets in the subsample in the ‘# of baskets’ column on the Species Composition Form.

2. Sort individuals in baskets to species.
3. Weigh and count individuals by species.

It's important to realize that not all baskets used to determine the catch category weight need to be used for species composition sample. For example, if Weight Method 1 – Actual Weight is used for catch category weight a subsample can be used for species composition. **Try to collect a minimum of 500lbs for species composition samples from catch categories that weigh over 500lbs.**

### Average Number Calculations

On trawl and prawn pot vessels, all species on the Species Composition Form **MUST** have an actual weight. In some cases, however, Observers do not have to count every individual in a species composition sample. Estimate the number of individuals by using an average number calculation when:

- The catch category contains a species that is physically very small and the quantity of the species in the haul is high, i.e. juvenile rockfish.
- The catch category contains many individuals of the same species and counting all of them would greatly reduce the size of the species composition sample, i.e. flatfish species.
- The species is with a **multiple species catch category**.



**Tip\*** When doing an average number calculation, count and weigh as many individuals as possible. At minimum, 15 individuals should be weighed and counted. For species that are caught in large quantities, count and weigh at least 50 individuals.



$$\text{Total Sample \#} = \frac{\text{\# of Individuals Actually Weighed}}{\text{Weight of Subsample (lbs)}} \times \text{Total Sample Weight (lbs)}$$

### Species Composition Form Instructions

The species composition information collected is recorded on the Species Composition Form (See Figure 4-15).

- **Haul Number** – Record the number of the haul that the sample came from.
- **Date** – Record the date as MM/DD/YY.
- **Trip Number** – Record the trip number generated by the database system.
- **Coast Guard Number** – Record the USCG vessel number on Limited Entry trawlers and fixed gear vessels (if they have one). If the vessel does not have a USCG number, leave this field blank.
- **Catch #** - Record the number that corresponds to the catch category on the Catch Form.
- **Sample Method** – Record the method used to sample the catch category.
  - 1 – Whole Haul
  - 2 – Single Basket
  - 3 – Multiple Baskets
- **# of Baskets** – ONLY For Sample Method 3 – Multiple Baskets, record the approximate or actual number of baskets the sample would fill.



- **Catch Category** – Record in capital letters the catch category sampled using the 4-Letter PacFin code.
- **KP Weight and KP Number** – Sum the total weight of all species in the catch category sample and place the total weight in the Keypunch (KP) Weight box. Sum up the total number of all species in the catch category sample and place the total number in the Keypunch (KP) Number box.
- **R or D** – Record whether the catch category sampled was **R** – Retained or **D** – Discarded.
- **Species** – Record the common name of the species in the sample. This column must be filled in with the species name. Do not only enter the species code! The common name listed on the paperwork must match the common name used in the database. See Appendices A, B, C and D for lists of species.
- **Species Code** – Record the species code of the corresponding species. This can be done prior to entering and not on deck. See Appendices A, B, C and D for lists of species and species codes.
- **Sample Weight** – Record the total weight of the species in the sample. This weight **MUST** be an actual weight.
- **Fish Number** – Record the number of fish of each species in the sample. This number may be an actual count (preferred) or calculated.
- **Reason for Discard** – Record the skipper's/crew's reason for discard for each discarded species.

1 - Prohibited – Only Salmon, Pacific Halibut, and Dungeness Crab

2 - Size – High-graded fish

3 - Market – Any market driven reason such as size (too big or small), no market, market price is too low, etc.



**TIP\*** Species which are unlikely to be retained, such as eelpouts, sculpins, and grenadiers are given a reason for discard of '3 - Market'.

4 - Regulation – Any regulatory reason including size, over quota, etc.

5 - Other – Document in comments actual reason for discard.



**Tip\*** Invertebrates such as starfish, anemones, and sea pens are given a reason for discard of '5 - Other'

7 – Predation – Caught fish that are eaten by any predator including marine mammals, seabirds, or sand fleas

- **Basket Weight and Number** – Use this column on deck for species that require multiple basket weights to get a total weight. These columns are not required. Be sure to fill the "Sample Weight" column in with the total weight of the species in the sample only!

Haul #

**SPECIES COMPOSITION FORM**

Page \_\_\_\_ of \_\_\_\_

Date

Trip Number

USCG #

Catch #	Catch Category	Sample Method	Basket #	KP Weight	R or D	Species	Species Code	Sample Weight	Fish #	Discard Reason	Basket Weight	#	Basket Weight	#
				KP Number										

Method : 1-Whole haul species 2-Single basket 3-Multiple basket 4-Fixed Gear Sample

Reason for discard: 1-Prohibited 2-Size 3-Market 4-Regulation 5-Other 6-Drop-off 7 - Predation

Species Composition Form v.3  
January 2004

Figure 4- 15: Species Composition Form

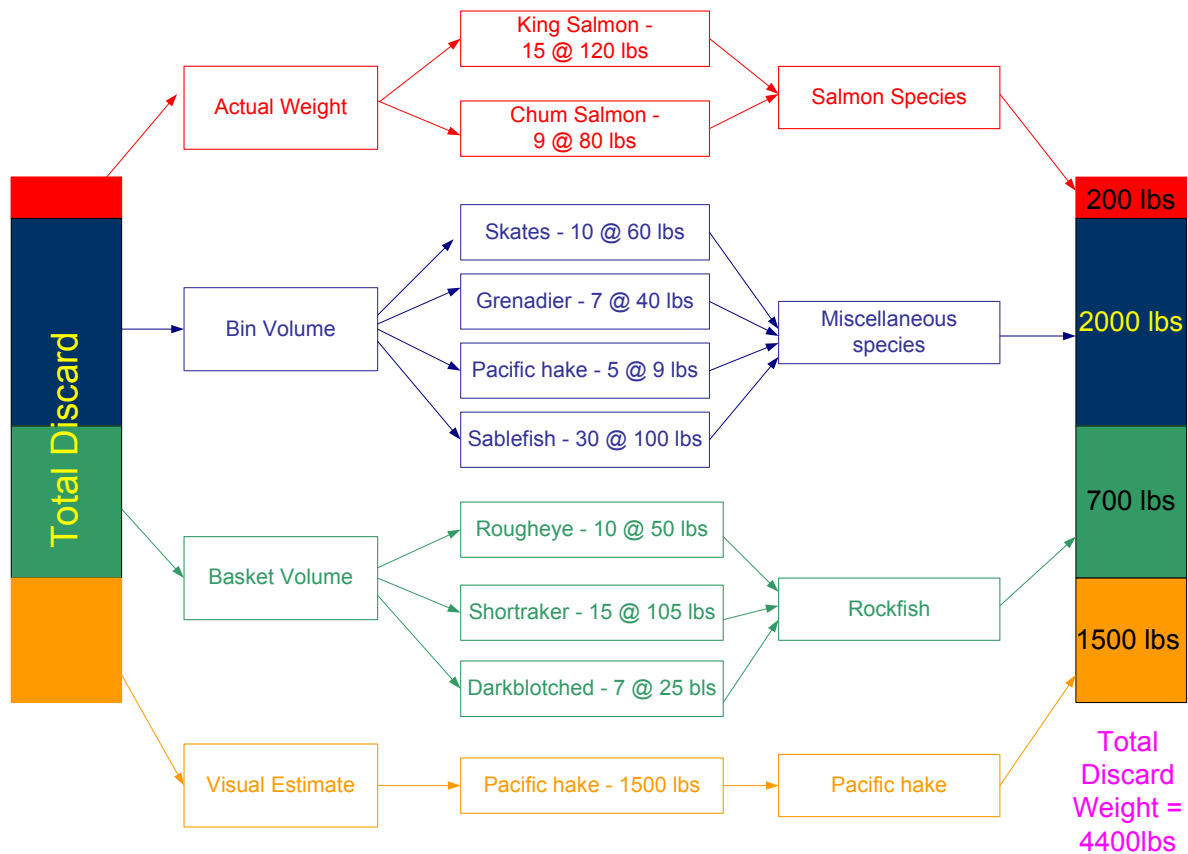


Figure 4- 16: Schematic of discard sampling on a trawl vessel

## Unsamped Hauls

There may be times when Observers are unable to sample a haul due to illness, injury, or weather conditions. When Observers are unable to sample a haul, complete the following:

### Trip Form

- Record location and catch information just like it is recorded for a sampled haul.
- Observer Total Catch Estimate – At minimum, make a visual estimate of the total catch weight.

### Trawl/Prawn Catch Form

- Record vessel estimates of retained catch categories.
- For discarded catch categories, place all species in one category, miscellaneous (ZMIS). Subtract the visual estimate of OTC from vessel estimate of retained species. Use Weight Method 5 – OTC – Retained to obtain an estimate on the discarded catch weight.
- Document the reason for discard as 5 - other.

### Discard That Cannot Be Attributed To A Specific Haul

On rare occasions, a vessel will discard fish from the hold. This happens if market conditions change during a trip or if they are catching larger fish that are worth more money. Record discard that cannot be attributed to a specific haul on the Trip Discard Form (See Figure 4-17).

### Trip Discard Form Instructions

The Trip Discard Form is not entered into the database system. Document the information from the Trip Discard Form in the Trip Comments on the Trip Page

- **Trip Number** – Record the trip number generated by the database system.
- **Coast Guard Number** – Record the USCG vessel number on Limited Entry trawlers and fixed gear vessels (if they have one). If the vessel does not have a USCG number, leave this field blank.
- **Date** – Document the month and day that the trip discard took place

- **Time** – Document the time, in Pacific Standard Time, that the trip discard took place.
- **Species** – Document the species that was discarded.
- **Weight** – Document the weight, in pounds, of species discarded.
- **# of Fish** – Document the number of fish discarded.
- **Weight Method** - Document the weight method used to estimate the species weight.
  - 1 - Actual Weight
  - 2 - Bin/Trawl Alley Estimate
  - 3 - Basket Volume Determination
  - 4 - Visual Estimate
  - 5 - OTC-Retained
  - 6 – Other
  - 7 - Vessel Estimate
  - 8 - Extrapolation
- **Discard Reason** - Record the skippers/crews reason of discard for each species.
  - 1 - Prohibited – Only Salmon, Pacific Halibut, and Dungeness Crab
  - 2 - Size – High-graded fish

- 3 - Market – Any market driven reason such as size (too big or small), no market, market price is too low, etc
  - 4 - Regulation – Any regulatory reason including size, over quota, etc.
  - 5 - Other – Document in comments actual reason for discard
  - 7 – Predation – Caught fish that are eaten by any predator including marine mammals, seabirds, or sand fleas
- **Comments** – Document any additional information that is important.

Page \_\_\_\_ of \_\_\_\_

Trip Discard Form

Trip Number

USCG #

Date		Time	Species	Weight	# of Fish	Weight Method	Discard Reason	Comments
Month	Day							

Trip Discard Form v.2 January 2004

Figure 4- 17: Trip Discard Form.





**Haul 1:**

As the codend came aboard, she visually estimated it at 5300 lbs. The crew pulled the zipper and dumped the codend into a rectangular trawl alley. She had premeasured the deck and found the length to be 2.6 meters and the width to be 1.4 meters. The catch varied in height throughout the trawl alley so Macy took three measurements, .7 meters, .9 meters, and .6 meters. Before the crew began to sort, Macy took two representative density baskets, filling each basket to the top of the holes. They weighed 64.92 lbs and 67.04 lbs.

The crew then began to presort Pacific halibut. She asked the crew to give her all Pacific halibut that were caught. She pulled out a tape measurer and took lengths of all the Pacific halibut, 65cm, 43cm, 62cm, 73cm, 91cm, 61cm, 74cm, 71cm, 56cm, 59cm, 25cm, 123cm, and 59cm.

Macy decided to use vessel estimates for retained catch categories. She whole hauled for discarded lingcod and rockfish. For the remaining discard, she did a Basket Weight Determination. She visually estimated that it would take 18 baskets to hold the entire discard and decided to take 6 baskets for average weights and species composition. The discard filled a total of 19 full baskets and one partial basket that weighed 27.62 lbs. She weighed the six randomly selected baskets, 56.92lbs, 54.07lbs, 39.64lbs, 45.71lbs, 59.36lbs, and 42.44lbs.

The species composition of the rockfish and lingcod was:

Darkblotched RF – 25 @ 76.42lbs

Greenstriped RF – 3 @ 8.61lbs

Canary RF – 1 @ 4.73lbs

Splitnose RF – 21 @ 7.10lbs

Lingcod – 4 @ 15.62lbs

The composition of the 6 baskets of discard she had collected was:

English sole – 2 @ 4.46lbs

Spiny dogfish shark – 8 @ 73.82lbs

Squid – 4 @ 9.15

Sablefish – 41 @ 92.93lbs

Arrowtooth flounder – 6 @ 12.04lbs

Skates – 16 @ 90.13lbs

Spotted Ratfish – 8 @ 8.99lbs

Jellyfish – 1 @ 4.60lbs

The skipper told Macy that the rockfish and lingcod were discarded due to regulations. The English sole, spiny dogfish shark, arrowtooth flounder, skates, squid, and ratfish were discarded because there was no market for them. All the sablefish were too small to be marketable.

### **Haul 2:**

Macy visually estimated it to be 8000 lbs. The crew unzipped the codend and dumped it into the trawl alley. She knew the length and width had not changed so she just took two height measurements, 1.2 meters and 1.5 meters. She randomly took two density baskets that weighed 56.94 lbs and 51.06 lbs. She had filled the baskets to the top of the holes again.

The catch was large and diverse in species. She again used vessel estimates for retained catch categories. The crew was sorting the discard right through a scupper because there was too much of it to retain on deck. Macy estimated that it would take 2 hours for the crew to sort through the

entire catch. She employed a random temporal frame for species composition and catch category weight. It ended up taking her 13 minutes and 20 seconds to take eight baskets of discard. She weighed the baskets, 56.23 lbs, 47.82 lbs, 45.92 lbs, 46.97 lbs, 51.26 lbs, 48.72 lbs, 50.41 lbs, and 55.23 lbs. The species composition of the eight baskets was:

Sablefish – 1 @ .46lbs  
 Skates – 62 @ 186.64lbs  
 Spotted Ratfish – 28 @ 35.35lbs  
 Sculpins – 5 @ .70lbs  
 Spiny dogfish shark – 3 @ 4.53 lbs  
 Arrowtooth flounder – 42 @ 33.06lbs  
 Rex sole – 42 @ 13.68lbs  
 English sole – 35 @ 15.37lbs  
 Dover sole – 64 @ 36.49lbs  
 Flathead sole – 123 @ 40.01lbs  
 Pacific sanddab – 13 @ 5.49lbs  
 Slender sole – 43 @ 9.46lbs  
 Dungeness crab – 1 @ 2.40lbs  
 Darkblotched RF – 65 @ 15.17lbs  
 Sunstars – 35 @ 2.86lbs  
 Greenstriped RF – 13 @ 1.43lbs  
 Anemone – 3 @ 1.41lbs

The total sort time of the haul was 2 hours and 11 minutes.

The skipper told her the sablefish, skates, and all the flatfish were discarded because they were too small. The ratfish, spiny dogfish shark, and greenstriped RF were discarded because there was no market. The darkblotched was discarded due to regulations.

She then completed the Trip form. The gear performed without any problems during both hauls. (She received the fish ticket from the skipper after returning. The fish ticket number was X943691):

LE OA EFP

## TRIP FORM - HAUL LOCATIONS

Page 1 of 1

USCG # 7 6 9 2 4 3

Observer name Macy Fields Year 2002

Trip Number 2 7

Vessel Name Allegiance

Logbook # 65459

Skipper First Name John

Skipper Last Name Doe

State Registration # (OA only)

Departure Date/Time 04/14/02 1930

Departure Port Westport, WA

Landing Date/Time 04/16/02 1535

Landing Port Westport, WA

Fish Tickets State Agency

X 9 4 3 6 9 1 Code W

Trip Notes:

Haul/ Set #		DATE		TIME (24-hour clock)	LATITUDE		LONGITUDE		Depth of catch (fathoms)	Gear Type	Target Strategy
		Month	Day		Degrees	Minutes	Degrees	Minutes			
1	Start <sup>1</sup>	04	15	1300	47	58 . 7	125	47 . 3	75	1	DTS
	End <sup>2</sup>	04	15	1730	48	02 . 6	125	45 . 5	75		
2	Start <sup>1</sup>	04	16	0800	47	20 . 3	125	28 . 3	89	1	DTS
	End <sup>2</sup>	04	16	1400	47	46 . 4	125	34 . 4	89		
	Start <sup>1</sup>					.		.			
	End <sup>2</sup>					.		.			
	Start <sup>1</sup>					.		.			
	End <sup>2</sup>					.		.			
	Start <sup>1</sup>					.		.			
	End <sup>2</sup>					.		.			
	Start <sup>1</sup>					.		.			
	End <sup>2</sup>					.		.			
	Start <sup>1</sup>					.		.			
	End <sup>2</sup>					.		.			
	Start <sup>1</sup>					.		.			
	End <sup>2</sup>					.		.			
	Start <sup>1</sup>					.		.			
	End <sup>2</sup>					.		.			
	Start <sup>1</sup>					.		.			
	End <sup>2</sup>					.		.			
	Start <sup>1</sup>					.		.			
	End <sup>2</sup>					.		.			

Start<sup>1</sup> - Time the brake is set End<sup>2</sup> - Time the brake is set

## TRIP FORM - HAULS

Weight UM: LBS

Volume UM: M<sup>3</sup>Density UM: LBS/M<sup>3</sup>

Haul/ Set #	Observer Total Catch Estimate	Volume of Codend or Trawl Alley/Bin	Density	Weight Method	Total Hooks/ Pots	Gear Perf	Beaufort	Comments
1	5503.83	2.67	2061.88	2		1		
2	8292.38	4.91	1687.50	2		1		
Key- punch Check	13796.21							

 Trip Form v. 2  
January 2004

Haul #  1

## TRAWL/PRAWN CATCH FORM\*

Page 1 of 2Date  0  4  1  5  0  2Trip Number    2  7USCG #   7  6  9  2  4  3

Catch #	R or D	Catch Category	Catch Weight	Volume	Density	#s of Fish 1. Req. for wt. methods 8,9 2. Req. if actual # for wt. methods 4,6	Weight Method	Catch Purity	Discard Reason	Vessel Estimate	Comments
1	D	ZMIS	112.48				1	M			
2	D	ZMIS	971.73				4	M			
3	D	PHLB	139.66			13	9	P			
4	R	SABL	300				7	P			
5	R	DOVR	4000				7	P			
6	R	LSPN	500				7	P			
7	R	SSPN	100				7	P			
Keypunch Check			5984.21			13					

\*Gear Types 1, 2, 3, 4, 5, 11, 12, 13, 14, 18

January 2004  
Trawl/Prawn Catch Form v. 4

Official Total Catch Calculations

Method: 2 - Bin Volume

Visual Estimate = 5300 lbs

Measurements:

$$L = 2.6\text{m}$$

$$W = 1.4\text{m}$$

$$h = .7\text{m}, .9\text{m}, .6\text{m}$$

$$h_{\text{avg}} = \frac{.7\text{m} + .9\text{m} + .6\text{m}}{3}$$

$$h_{\text{avg}} = .733333333\text{m}^3$$

Density Samples:

$$64.92\text{lbs}$$

$$+67.04\text{lbs}$$

$$131.96\text{lbs}$$

$$\frac{131.96\text{lbs}}{2 \text{ baskets}} = 65.98\text{lbs}$$

$$\text{Density} = \frac{\text{Weight (lbs)}}{\text{Volume (m}^3\text{)}}$$

$$\text{Density} = \frac{65.98\text{lbs}}{0.032 \text{ m}^3} = \frac{2061.875\text{lbs}}{\text{m}^3}$$

Formula:

$$\text{Volume} = \text{Length} \times \text{Width} \times \text{Height} = 2.6\text{m} \times 1.4\text{m} \times .733333333\text{m} = 2.669333331\text{m}^3$$

Additional  
Calculations:

$$\text{OTC} = \text{Volume} \times \text{Density} = 2.669333331\text{m}^3 \times \frac{2061.875\text{lbs}}{\text{m}^3}$$

$$\text{OTC} = 5503.831661 \text{ lbs}$$



## SPECIES COMPOSITION FORM

USCG #		<b>2</b>	6	9	2	4	3
--------	--	----------	---	---	---	---	---

Method : 1-Whole haul species 2-Single basket 3-Multiple basket 4-Fixed Gear Sample  
Reason for discard: 1-Prohibited 2-Size 3-Market 4-Regulation 5-Other 6-Drop-off 7 - Predation

## Species Composition Measurements and Calculations

R or D	Catch Category	Density Samples	Measurements, Formulas, and Calculations	Total Weight
D	ZMIS 2	<p>Average Weight Baskets =</p> <p>56.92 lbs    54.07 lbs  39.64 lbs    45.71 lbs  59.36 lbs    42.44 lbs</p> <p>= 298.14 lbs</p>	<p>BWD = Avg basket weight X # of baskets  Avg Basket Weight = <u>298.14lbs</u> = 49.69 lbs  6 baskets  BWD = (49.69 lbs X 19 baskets) + 27.62 lbs =</p> <p>ZMIS 2 Weight = 971.73 lbs</p>	971.73 lbs
D	PHLB		<p>65 - 6.90 lbs      74 - 10.49 lbs  43 - 1.81 lbs      71 - 9.19 lbs  62 - 5.93 lbs      56 - 4.25 lbs  73 - 10.05 lbs     59 - 5.05 lbs  91 - 20.53 lbs     25 - .31 lbs  61 - 5.62 lbs      123 - 54.48 lbs  59 - 5.05 lbs</p>	13 @ 139.66 lbs

Haul #  2

## TRAWL/PRAWN CATCH FORM\*

Page 1 of 2Date  0  4  1  6  0  2

Trip Number

   2 7

USCG #

 7  6  9  2  4  3

Catch #	R or D	Catch Category	Catch Weight	Volume	Density	#s of Fish 1. Req. for wt. methods 8,9 2. Req. if actual # for wt. methods 4,6	Weight Method	Catch Purity	Discard Reason	Vessel Estimate	Comments
1	D	ZMIS	3628.58				4	M			
2	R	SABL	100				7	P			
3	R	DOVR	5000				7	P			
4	R	LSPN	800				7	P			
5	R	SSPN	150				7	P			
Keypunch Check			9678.58								

\*Gear Types 1, 2, 3, 4, 5, 11, 12, 13, 14, 18

January 2004

Trawl/Prawn Catch Form v. 4

Official Total Catch Calculations

Method: Bin Volume

Visual Estimate = 8000 lbs

Measurements:

$$L = 2.6\text{m}$$

$$W = 1.4\text{m}$$

$$h = 1.2\text{m}, 1.5\text{m}$$

$$h_{\text{avg}} = \frac{1.2\text{m} + 1.5\text{m}}{2}$$

$$h_{\text{avg}} = 1.35\text{m}^3$$

Density Samples:

$$56.94\text{lbs}$$

$$+51.06\text{lbs}$$

$$108.00\text{lbs}$$

$$\frac{108.00\text{lbs}}{2 \text{ baskets}} = 54.00\text{lbs}$$

$$2 \text{ baskets}$$

$$\text{Density} = \frac{\text{Weight (lbs)}}{\text{Volume (m}^3\text{)}} =$$

$$\text{Density} = \frac{54.00\text{lbs}}{0.032 \text{ m}^3} = \frac{1687.50\text{lbs}}{\text{m}^3}$$

Formula:

$$\text{Volume} = \text{Length} \times \text{Width} \times \text{Height} = 2.6\text{m} \times 1.4\text{m} \times 1.35\text{m} = 4.914\text{m}^3$$

Additional  
Calculations:

$$\text{OTC} = \text{Volume} \times \text{Density} = 4.914\text{m}^3 \times \frac{1687.50\text{lbs}}{\text{m}^3}$$

$$\text{OTC} = 8292.375 \text{ lbs}$$

Haul # 0 2

## SPECIES COMPOSITION FORM

Page 2 of 2

Date 0 4 1 5 0 2

Trip Number 2 7

USCG # 7 6 9 2 4 3

Catch #	Catch Category	Sample Method	Basket #	KP Weight KP Number	R or D	Species	Species Code	Sample Weight	Fish #	Discard Reason	Basket Weight	#	Basket Weight	#
1	ZMIS	3	8	404.51	D	Sablefish	203	.46	1	2				
				578		Skates	90	186.64	62	2				
						Spotted ratfish	99	35.35	28	3				
						Sculpins	400	.70	5	3				
						Spiny Dogfish	66	4.53	3	3				
						Arrowtooth Flounder	141	33.06	42	2				
						Rex Sole	105	13.68	42	2				
						English sole	108	15.37	35	2				
						Dover sole	107	36.49	64	2				
						Flathead sole	103	40.01	123	2				
						Pacific sanddab	137	5.49	13	2				
						Slender sole	111	9.46	43	2				
						Dungeness Crab	12	2.40	1	1				
						Darkblotched RF	311	15.17	65	4				
						Sunstars	24	2.86	35	5				
						Greenstriped RF	313	1.43	13	3				
						Anemone	55	1.41	3	5				

Method : 1-Whole haul species 2-Single basket 3-Multiple basket 4-Fixed Gear Sample  
Reason for discard: 1-Prohibited 2-Size 3-Market 4-Regulation 5-Other 6-Drop-off 7 - Predation

Species Composition Form v.3  
January 2004

## Species Composition Measurements and Calculations

R or D	Catch Category	Density Samples	Measurements, Formulas, and Calculations	Total Weight
D	ZMIS 1	<p>Basket Weights</p> <p>56.23 lbs    47.82 lbs  45.92 lbs    46.97 lbs  51.26 lbs    48.72 lbs  50.41 lbs    55.23 lbs</p> <p>= 402.56 lbs</p>	<p>Temporal Estimate</p> <p>Total sample time = 13 min, 20 sec  Total sort time = 2 hr, 11 min  Total sample weight = 402.56 lbs</p> <p>Sample Time = (13 min X <math>\frac{60 \text{ sec}}{1 \text{ min}})</math> + 20 sec = 800 sec</p> <p>Total Sort Time = (2 hr X <math>\frac{60 \text{ min}}{1 \text{ hr}}</math> X <math>\frac{60 \text{ sec}}{1 \text{ min}})</math> + 11 min = 7211 sec</p>	
			<p>ZMIS 1 = Sample Wt X <math>\frac{\text{Sort Time}}{\text{Sample Time}}</math></p> <p>ZMIS 1 Weight = 402.56 lbs X <math>\frac{7211 \text{ sec}}{800 \text{ sec}}</math> = 3628.5752 lbs</p>	3628.58 lbs

## Prawn Pot Trip Example

Lance Jones was aboard the Pit Stop (CF4976EF), an open access shrimper. The skipper was Pete Lamprey. Lance recorded the following departure information:

Depart date/time: 07/01/02 0600 from Eureka

Lance recorded the following location information on the back of the Catch Form:

Haul Start: 0915	Position: 43 49.06	126 15.26
Haul End: 1036	Position 43 49.01	126 15.28

The set had 15 pots.

Lance whole hauled for discard. He found:

<u>Species</u>	<u>#</u>	<u>Weight</u>
Starfish:	30	17.38
Snailfish	5	.31
Hermit Crab	414	6.89
Inverts, Unid	1	29.35
Octopus, Unid	4	1.14
Coonstripe shrimp	230	2.35
Pacific Cod	2	.24
Hagfish	3	1.20
Sculpin	1	.10
Poacher	2	.04
Dungeness Crab	3	.17
Greenling, Unid	1	.25
Lingcod	2	.24

Vessel estimate of retained shrimp = 30.00lbs (asked skipper)

Reasons for Discard (asked skipper)

Coonstripe shrimp, and P.cod was because they were too small (high-grading)

Lingcod because it was too small according to regulations

Everything else because there was no market

The vessel returned on 07/01 at 1600 to Eureka. The fish ticket number for the trip was V477562.

CHAPTER 4

Haul #

TRAWL/PRAWN CATCH FORM\*

Page 1 of 2

Date

Trip Number

USCG #

Catch #	R or D	Catch Category	Catch Weight	Volume	Density	#'s of Fish 1. Req. for wt. methods 8,9 2. Req. if actual # for wt. methods 4,6	Weight Method	Catch Purity	Discard Reason	Vessel Estimate	Comments
1	R	SRMP	30.00				7	P			
2	D	ZMIS	59.66				1	M			
Keypunch Check			89.66								

\*Gear Types 1, 2, 3, 4, 5, 11, 12, 13, 14, 18



Official Total Catch Calculations
-----------------------------------

Method: 11- Retained + Discarded      Visual Estimate = 100 lbs

Measurements:

Density Samples:

$$\text{OTC} = 30.00 \text{ lbs} + 59.66 \text{ lbs} = 89.66 \text{ lbs}$$

Haul start: 0915      Position: 40 49.06    124 15.26

Haul end: 1036      Position: 40 49.01    124 15.28

# of Pots:

/// /// ///

Formula:

Additional  
Calculations:

CHAPTER 4

Haul # 0 1

**SPECIES COMPOSITION FORM**

Page 2 of 2

Date 0 7 0 1 0 2

Trip Number    1 3

USCG #

Catch #	Catch Category	Sample Method	Basket #	KP Weight KP Number	R or D	Species	Species Code	Sample Weight	Fish #	Discard Reason	Basket Weight	#	Basket Weight	#
2	ZMIS	1		59.66 698	D	Starfish	20	17.38	30	5				
						Snailfish	500	.31	5	3				
						Hermit Crab	15	6.89	414	5				
						Inverts, Unid	13	29.35	1	5				
						Octopus, Unid	60	1.14	4	3				
						Coonstripe Shrimp	71	2.35	230	2				
						P. Cod	202	.24	2	2				
						Hagfish	77	1.20	3	3				
						Sculpin	400	.10	1	3				
						Poacher	450	.04	2	3				
						Dungeness Crab	12	.17	3	3				
						Greenling, Unid	390	.25	1	3				
▼	▼	▼			▼	Lingcod	603	.24	2	4				

Method : 1-Whole haul species 2-Single basket 3-Multiple basket 4-Fixed Gear Sample  
Reason for discard: 1-Prohibited 2-Size 3-Market 4-Regulation 5-Other 6-Drop-off 7 - Predation

Species Composition Form v.3  
January 2004